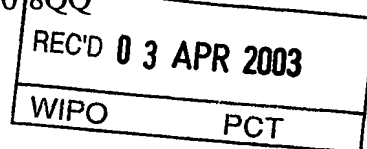


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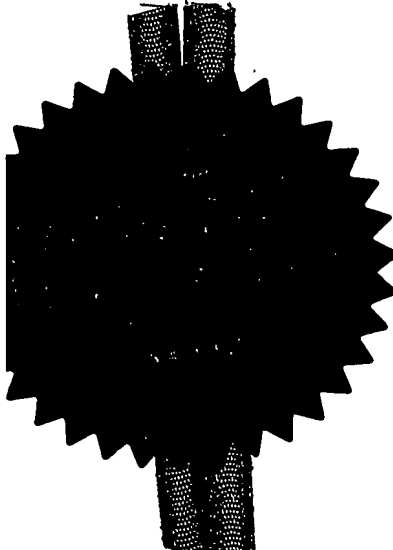
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2. Patent application number (The Patent Office will fill in this part)	24 JAN 2002	0201584.0	
3. Full name, address and postcode of the or of each applicant (underline all surnames)	Stewart Dalgarno 60 Barratt Drive Ellon Aberdeenshire AB41 9EQ United Kingdom	Calum John Mackinnon 26 Belrorie Circle Dyce Aberdeen AB21 7LT United Kingdom	
Patents ADP number (if you know it)			
If the applicant is a corporate body, give the country/state of its incorporation	8310443001	8310450001	
4. Title of the invention	Release hook		
5. Name of your agent (if you have one)	Kennedys Patent Agency Limited Floor 5, Queens House 29 St Vincent Place GLASGOW G1 2DT United Kingdom		
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Patents ADP number (if you know it)	805824000		
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing (day / month / year)	
8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	Yes		

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Claim(s)

Abstract

Drawing(s)

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12. Name and daytime telephone number of person to contact in the United Kingdom

David Kennedy  
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Patents Form 1/77

1 Release hook

2

3 The present invention relates to hooks used on cranes and  
4 lifts and in particular, although not exclusively, to a  
5 hook that selectively releases a load being supported by  
6 the hook.

7

8 It has been recognised in the prior art that for many  
9 environments such as offshore oil and gas exploration,  
10 the use of an automated release mechanism for a hook can  
11 be advantageous. In particular, this allows the operator  
12 to be remote from the hook when the load is released  
13 providing for a safer working environment.

14

15 The original hooks which incorporated release mechanisms  
16 automatically released when the load reached the ground  
17 and the cable tension slackened. Unfortunately, a  
18 disadvantage of these systems is that the load can only  
19 be released when it is set down and also, if the load is  
20 placed in the wrong position it has to be manually placed  
21 back upon the hook for it to be moved again.

22

23 A remotely controlled crane hook which provides for  
24 selective ejection of a load from a hook, is proposed in

1 GB Patent Application No 2,293,497. In this hook a  
2 sliding ejector lever is used under the cable or guide  
3 ropes. To operate the hook, a hydraulic ram moves the  
4 ejector lever up, thereby ejecting the guide ropes over a  
5 retaining edge of the hook. Though this hook has the  
6 advantage that it can be remotely operated to allow the  
7 crane operator to be distant from the hook whilst  
8 selectively choosing when the load is released, it has a  
9 major disadvantage in its size and weight. To operate the  
10 ejector it requires a housing including a motor, a  
11 hydraulic pump driven by the motor, a power supply for  
12 the motor, a hydraulic ram driven by the hydraulic pump  
13 together with the necessary control circuitry for remote  
14 operation. Such a hook including these components is  
15 ~~typically one metre in length and one metre in diameter~~  
16 ~~with a weight of around 500 kg. As this hook is so large~~  
17 ~~and heavy it is difficult for a crane operator to~~  
18 ~~manoeuvre the hook to attach a load. A further~~  
19 ~~disadvantage of this hook is that it is welded together~~  
20 ~~to form a one piece body containing the ejector lever.~~  
21 Such an arrangement prevents the hook being disassembled  
22 for repair.

23

24 One hook which overcomes these disadvantages is described  
25 in International Patent Application No WO98/37009. This  
26 Application discloses a release mechanism within a hook  
27 for use in supporting a load from a crane. The hook is  
28 again remotely operable and the load is released by an  
29 identical ejector lever mechanism operated by the  
30 standard hydraulic ram. The advantage of this system is  
31 that the power and control means for the hydraulic ram is  
32 located in a housing connected to the hook via a support  
33 link. While this reduces the weight on the hook, making

1 the hook more manageable for an operator, this system has  
2 the disadvantage that the hook including the power  
3 control housing is approximately 6 metres in length. The  
4 connections via the support link between the housing and  
5 the hook prevent the hook from independently swivelling  
6 and thus the full length and weight of the combination  
7 must be manoeuvred to swivel the hook to the correct  
8 direction for connecting a cable onto the hook.

9

10 It is an object of the present invention to provide a  
11 hook for use in supporting a load from a crane, which  
12 obviates or mitigates one or more disadvantages of the  
13 prior art.

14

15 It is a further object of the present invention to  
16 provide a hook for use in supporting a load from a crane,  
17 the hook being capable of selectively releasing the load  
18 by an ejector lever, the ejector lever not being operated  
19 by hydraulic means. By removing the hydraulic means to  
20 operate the ejector lever, the weight and dimensions of  
21 the hook can be reduced to make a more lightweight and  
22 compact hook, which is more manoeuvrable and safer to  
23 operate.

24

25 It is a further object of the present invention to  
26 provide a hook for use in supporting a load from a crane,  
27 the hook being capable of selectively releasing the load  
28 by an ejector lever, the ejector lever being operated by  
29 a motor and gearing means located within the hook.

30

31 It is an object of at least one embodiment of the present  
32 invention to provide a hook for use in supporting a load  
33 from a crane, the hook being capable of selectively

1 releasing the load by an ejector lever operated via  
2 remote control.

3

4 According to a first aspect of the present invention,  
5 there is provided a release hook for selectively  
6 releasing a load supported on the hook, the hook  
7 including an ejector lever for releasing the load from  
8 the hook upon actuation of the ejector lever wherein  
9 actuation of the ejector lever is provided by a motor and  
10 gearing means located adjacent the ejector lever.

11

12 As the motor and gears up less space than the hydraulic  
13 ram and its associated power supplies, the hook is  
14 therefore lightweight and the gearing means and motor can  
15 ~~be housed within a hook of relatively small dimensions~~

16 and weight.

17

18 Preferably, the motor is remotely operated. More  
19 preferably the remote operation is by a wireless  
20 telemetry system as is known in the art. Preferably, the  
21 motor is an electric motor driven from a battery housed  
22 in the hook.

23

24 Preferably, the hook comprises a housing having two  
25 interconnected generally 'C' shaped sections with the  
26 ejector lever being located at a base of the 'C' between  
27 the sections. The sections may be bolted together.

28 Preferably, also the hook includes a catch. The catch  
29 may be located across an opening of the hook where the  
30 cable carrying the load is inserted. The catch may  
31 comprise an elongate member attached to the ejector  
32 lever. The catch prevents the cable being prematurely

1 ejected when the hook is moved. Thus, the catch actively  
2 retains the cable within the hook.

3  
4 Preferably, the gearing means comprises a rack and  
5 pinion, the pinion being operable via the motor. The  
6 rack is preferably located on the ejector lever. In this  
7 manner, rotation of the motor causes mutual engagement of  
8 teeth in the pinion with teeth on the rack and  
9 consequently the ejector lever is moved linearly in  
10 relation to the rotating pinion of the motor. Most  
11 preferably, this linear motion is vertical on the hook,  
12 raising the ejector lever towards the opening.

13  
14 Alternatively, the gearing means may comprise a worm  
15 gear. In this arrangement the motor will turn the worm  
16 whose screw thread is located against matching notches on  
17 an edge of the ejector lever. Thus, operation of the  
18 motor allows the ejector lever to be raised or lowered  
19 along the linear axis of the worm. This gearing means  
20 has the additional advantage that the motor need only  
21 turn a small amount to provide a significant distance  
22 change on the ejector lever.

23  
24 Preferably also, the hook includes a pad-eye which may be  
25 referred to as a clevis. The pad-eye provides the  
26 contact between the hook and a crane. In one embodiment  
27 of the present invention the pad-eye includes an eye-let  
28 aperture such that a link may be made between the pad-eye  
29 and a crane block of the crane. In a further embodiment  
30 of the present invention the pad-eye comprises a shaft  
31 including connection means to a crane block. Preferably  
32 the connection means is a screw thread on the shaft and a



1 matching threaded recess in the crane block. Thus, the  
2 hook may be located at or within the crane block.

3  
4 Advantageously the pad-eye is swivel mounted on a top of  
5 the hook. The pad-eye may include a base of greater  
6 diameter than the shaft, such that the base is retained  
7 between the two sections of the housing while remaining  
8 rotatable with respect to the housing.

9  
10 Preferably the hook has dimensions of less than 17.05 x  
11 9.86 x 3 inches in height, width and depth respectively.  
12 Preferably also the hook has a weight of approximately 12  
13 to 16 kg. Preferably the hook is made of steel or the  
14 like. Advantageously the hook provides a 12 tonne lift.

15

---

16 Embodiments of the present invention will now be  
17 described by way of example only with reference to the  
18 following drawings which:

19  
20 Figure 1 is a cross-sectional schematic view of a release  
21 hook according to the present invention;

22  
23 Figure 2 is a cross-sectional schematic view of a release  
24 hook including a gearing means according to a first  
25 embodiment of the present invention;

26  
27 Figure 3 is a cross-sectional schematic view of a release  
28 hook including a gearing means according to a second  
29 embodiment of the present invention;

30  
31 Figure 4 is a cross-sectional view of a pad-eye of a hook  
32 according to an embodiment of the present invention; and

1 Figure 5 is a schematic plan view of a pad-eye of a hook  
2 according to a further embodiment of the present  
3 invention.

4  
5 Reference is initially made to Figure 1 of the drawings  
6 which illustrates a release hook, generally indicated by  
7 reference numeral 10, according to the present invention,  
8 a hook 10 comprises a body 12 having a top surface 14  
9 where a pad-eye 16 is located. Pad-eye 16 will be  
10 described hereinafter but. As is known in the art, pad-  
11 eyes are used for making a connection between the hook 10  
12 and a crane block (not shown).

13  
14 Body 12 has a generally "C" shaped structure, there being  
15 an opening 18 through which a cable 20 may be inserted.  
16 Within the body is a recess 22 formed past the opening  
17 over a lip 24. The lip 24 helps maintain the cable 20  
18 within recess 22. It will be appreciated that cable 20  
19 may represent any load positioned on the hook 10 to be  
20 lifted. Body 12 generally comprises 2 'C' shaped  
21 sections bolted together via bolts 26A-E. These bolts  
22 26A-E allow the body 12 to be disassembled so that access  
23 can be made to the parts therein.

24  
25 Located between the body sections is an ejector lever 28.  
26 Ejector lever 28 has a generally rectangular shape from  
27 which is cut a section 30. Section 30 has a right-angled  
28 corner portion 32 and a sloping surface 34. The ejector  
29 lever 28 may be referred to as a guillotine such that  
30 when moved upwards towards the pad-eye 16, the cable 20  
31 will be inclined to travel down the slope 34 and out of  
32 opening 18.

33

1 Attached to ejector lever 28, is a catch 36. The catch  
2 36 provides a closing portion over recess 22. The catch  
3 36 is an elongate member having a length equal to or  
4 greater than the opening 18. The catch 36 acts as a  
5 safety mechanism in the event that the hook 10 is moved  
6 substantially during lifting, thus preventing cable 20  
7 from exiting the recess 22 until selectively requested to  
8 do so.

9

10 At a side of ejector lever 28 is a gearing arrangement  
11 38. The gearing arrangement 38 is driven from spindle 40.  
12 This arrangement of gears ensures that when spindle 40 is  
13 turned, the gears operate the ejector lever 28 and  
14 thereby move the ejector lever in a linear motion  
15 vertically upwards or downwards towards or away from the  
16 pad-eye 16. The spindle 40 is controlled from an  
17 electric motor 42. The electric motor 42 is powered from  
18 a battery 44. It will be appreciated that the battery  
19 may be of any replaceable form and in the embodiment  
20 shown the battery is a 12-volt dry cell battery. The  
21 motor 42 has a right-angled motor drive which is attached  
22 to the spindle 40, being a Teflon gear which moves the  
23 ejector lever up and down on a worm, or gear 41. The  
24 gear 41 is fixed to the ejector lever 28, by brass  
25 bushels 46A,B.

26

27 The ejector lever 28 is remotely controlled. This is  
28 achieved through a telemetry system 48, housed within the  
29 body 12. A remote panel (not shown) is operated by a  
30 crane operator at a remote distance from the hook 10.  
31 Signals from the remote panel are transmitted and  
32 received via the antenna 50 located at the top 14 of the  
33 hook 10. The signals are relayed to the telemetry system

1 48. This in turn controls the motor 42 and consequently,  
2 the gearing means 38 for movement of the ejector lever  
3 28.

4  
5 When constructed, the hook 10 has general dimensions of  
6 height less than 20 inches, width less than 10 inches and  
7 a depth less than 3 inches. In a preferred embodiment the  
8 height is 17.05 inches, width is 9.86 inches and the  
9 depth is 3 inches. In a further embodiment of the  
10 present invention, a compact hook 10 has dimensions,  
11 height 14 inches, width 8 inches and depth 2.25 inches.

12  
13 The weight of the hook is approximately 12 to 16  
14 kilograms depending on the material of construction. In  
15 the preferred embodiment the material is steel however it  
16 will be appreciated that many other materials and alloys  
17 thereof can be used. The hook 10 can provide a 12 tonne  
18 lift.

19  
20 In use, hook 10 is mounted on a support link (not shown)  
21 via pad-eye 16 to a crane block(not shown) of a crane. An  
22 operator pushes a cable 20, chain or the like onto the  
23 hook via opening 18 and by operation of the catch 36 the  
24 cable 20 is secured within recess 22. The load connected  
25 to the cable 20 may now be lifted by the hook 10 and  
26 moved by the crane. When the load is in the correct  
27 position, or it is determined that the load should be  
28 ejected from the hook, the operator provides a signal via  
29 their control panel located remotely from the hook 10.  
30 The signal is transmitted through antenna 50 to the  
31 telemetry system 48. System 48 transmits a signal to  
32 start the motor 42 which is powered from the 12 volt  
33 battery 44. The motor 42 drives spindle 40 whose rotation

1 causes the gearing, 38 to be moved and thereby the ejector  
2 lever 28 is moved vertically towards the pad-eye 16. As  
3 the ejector lever 28 moves, cable 20 engages with the  
4 sloping surface 34. At the same time, ~~catch 36 is moved~~  
5 away from opening 18 and consequently, cable 20 is  
6 ejected through opening 18 in a guillotine like motion.  
7 The load is then separate from the hook and the ejector  
8 lever can be signalled to relocate into the recess.

9

10 Reference is now made to Figure 2 of the drawings, which  
11 illustrates a hook 10, having a gearing arrangement 38A  
12 according to a first embodiment of the present invention.  
13 Identical parts to those of Figure 1 have been given the  
14 same reference numeral while like parts are given the  
15 ~~same reference numeral but are now suffixed 'A'.~~ In this

16 ~~embodiment motor 42 drives a spindle 40A which is now~~  
17 mounted linearly to worm 41A. Thus spindle 40A turns  
18 worm 41A. Worm 41A engages with teeth 52, which are  
19 mounted on a side of the ejector lever 28. In this  
20 embodiment the ejector lever 28 is moved vertically by  
21 the engagement of the teeth 52 with the worm 41A.

22

23 A further gearing arrangement according to a second  
24 embodiment of the present invention is illustrated in  
25 Figure 3. Again, identical parts to those of Figure 1  
26 have been given the same reference numeral while like  
27 parts are given the same reference numeral but are now  
28 suffixed 'B'. In this embodiment the gearing arrangement  
29 38B is a rack and pinion system. Spindle 40B, the  
30 pinion, is attached to motor 42. As spindle 40 rotates,  
31 teeth 54 engage with similar teeth 56 on the rack 41B  
32 located on the side of the ejector lever 28. It will be  
33 appreciated that the spindle 40B may be rotated in either

11

1 direction to move the ejector lever 28 upwards or  
2 downwards as required. Additionally the spindle 40B may  
3 be mounted at right angles to the motor so that teeth 54  
4 are perpendicular to teeth 56.

5

6 Reference is now made to Figure 4 of the drawings which  
7 illustrates a pad-eye of the hook according to an  
8 embodiment of the present invention. Pad-eye 16C  
9 comprises a one piece body having a shaft 58 and a base  
10 60. The base 60 may be of any shape provided that it is  
11 retained within the body 12 of the hook 10 and the body  
12 12 can swivel freely through 360 degrees on the pad-eye  
13 16C. In the embodiment shown the shaft 58 and base 60 are  
14 'T' shaped. Shaft 58 includes an aperture 62 through  
15 which a connection can be made. Aperture 62 is  
16 cylindrical having rounded edges to prevent rubbing on  
17 cables or connectors. In use, pad-eye 16C is mounted  
18 between the two sections of the body 12 and the shaft 58  
19 is located through an aperture 64 formed at the join  
20 between the sections of the body 12.

21

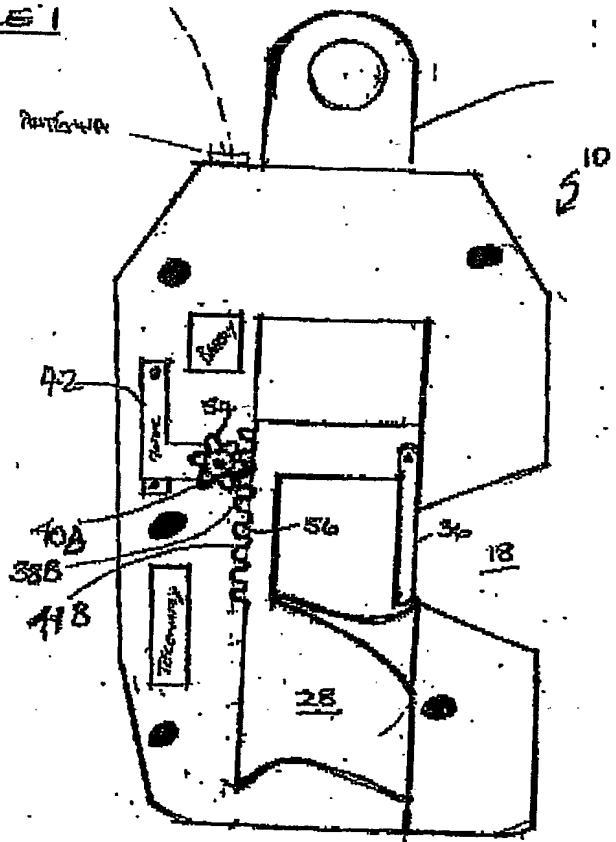
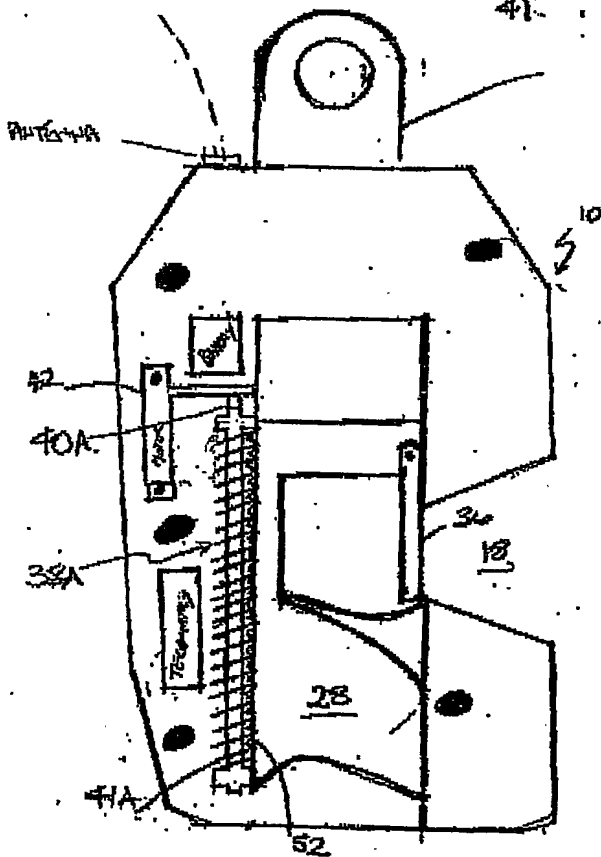
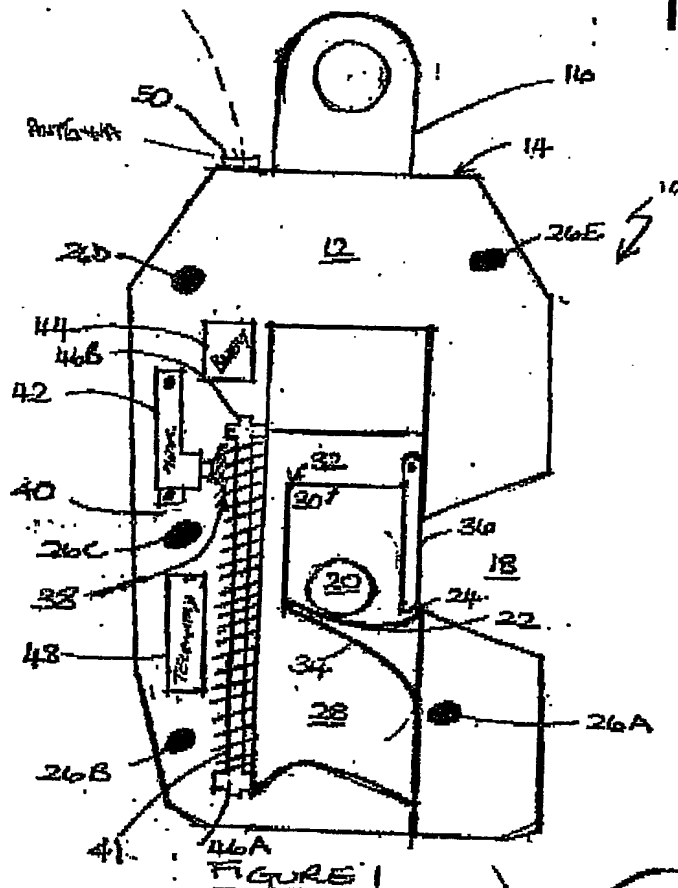
22 Reference is now made to Figure 5 of the drawings which  
23 illustrates a pad-eye according to a further embodiment  
24 of the present invention. Pad-eye 16D is identical to  
25 pad-eye 16C of Figure 4 except for the shaft. The shaft  
26 66 of this embodiment has no aperture. Shaft 66 includes  
27 a threaded portion 68 at a distal end 70 of the shaft 66.  
28 In use, pad-eye 16D is located into the body 12 of the  
29 hook 10 in an identical manner to that of pad-eye 16C  
30 while the threaded portion 68 is screwed into a threaded  
31 hole located in a crane block. This embodiment offers the  
32 advantage of taking the crane block out of the work area.

1 A principal advantage of the present invention is that it  
2 provides a lightweight and compact release hook compared  
3 to the prior art. This is achieved by removing the  
4 requirement of having a hydraulic ram with the associated  
5 pump and drive means generally needed with such release  
6 hooks.

7  
8 A further advantage of the present invention is that the  
9 hook is composed of detachable parts, so that access can  
10 be given to the internal workings for replacement and  
11 repair. For example, battery 44 will need to be replaced  
12 or recharged at intervals.

13  
14 It will be appreciated by those skilled in the art, that  
15 further modifications may be made to the invention as  
16 described herewith without departing from the scope  
17 thereof. For example, alternative gearing arrangements  
18 driven from a motor could be used. Equally, the motor  
19 could be driven by a different power source than battery  
20 as long as they do not require any external connections  
21 to the hook which would prevent the hook from swivelling  
22 freely.

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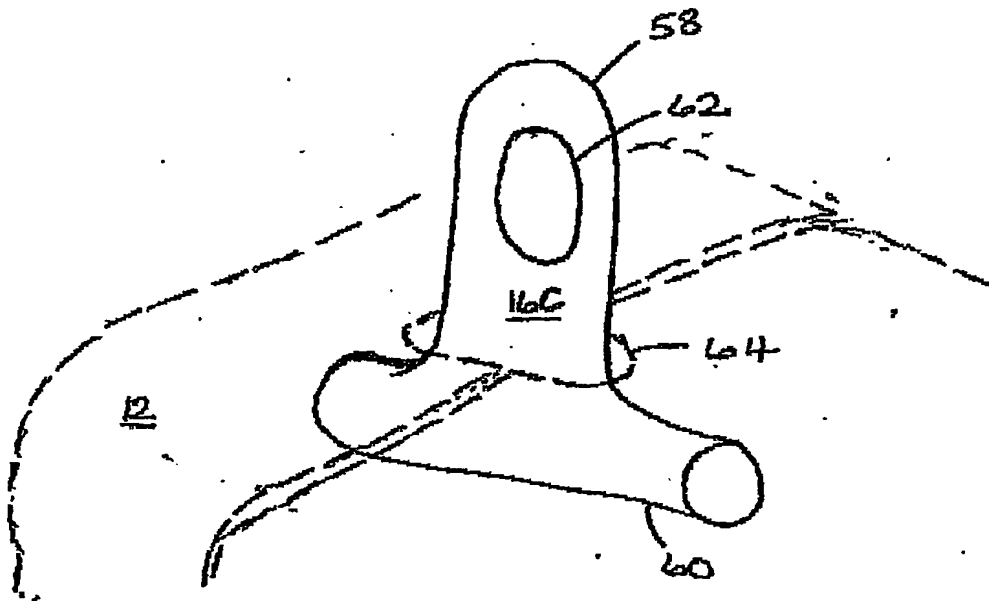
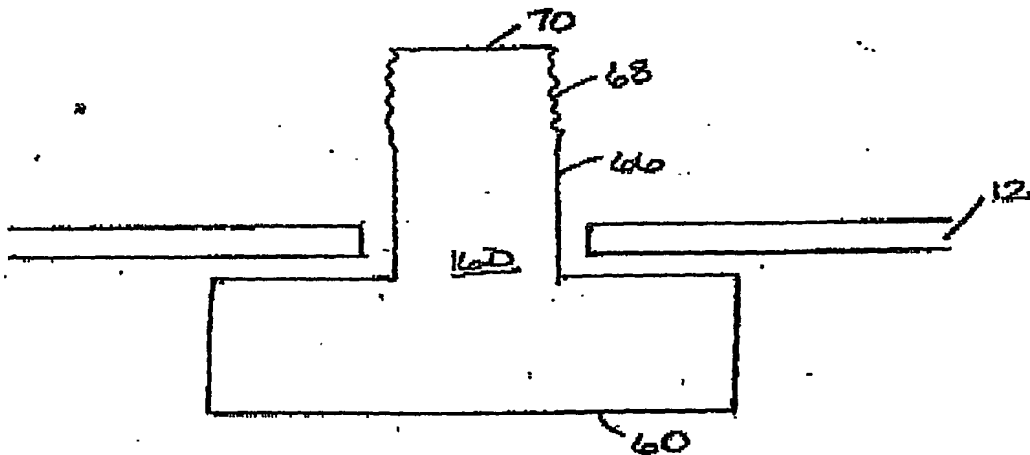
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FIGURE 4FIGURE 5



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